

## The Perceived Oral Health Status, Practices, Knowledge and Periodontal Status of Pregnant Women in a Maternity Hospital in Trinidad

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### Abstract

**Background:** The aim of this study is to report the oral health status, practices, knowledge and periodontal status of pregnant women in a maternity hospital in Trinidad.

**Methods:** A convenience sample of pregnant women who attended a maternity hospital was recruited. Data were collected using a self-administered questionnaire which included frequency and reason for dental attendance, perceived oral health status and oral health knowledge and practices. Oral health examinations took place at the University of the West Indies (UWI), School of Dentistry including the Basic Periodontal Examination (BPE). Data were analyzed using SPSS version 24.0 in which descriptive analysis and Chi-square tests were performed.

**Results:** 161 pregnant women participated. Nearly 60% rated their oral health as average or good. Almost half (46.0%) stated safety concerns with dental treatment during pregnancy prevented them from seeking care and 73.3% did not believe that a mother's poor oral health could contribute to low birth weight (LBW) babies. The majority (91.9%) did not attend the dentist routinely and nearly 60% had some form of periodontitis, mild (34.2%) or moderate to severe (25.2%). Significant associations were found between level of education and brushing ( $p < 0.05$ ), age and smoking ( $p < 0.05$ ), BPE and age ( $p < 0.05$ ) and BPE and ethnicity ( $p < 0.05$ ).

**Conclusions:** There are important gaps and misconceptions in oral health knowledge and practices of pregnant women and the prevalence of periodontitis was found to be high and related to age and ethnicity.

**Keywords:** Pregnancy; Oral Health; Periodontal Health; Women; BPE

### Abbreviations

UWI: University of the West Indies; BPE: Basic Periodontal Examination; LBW: Low Birth Weight

### Introduction

Oral health can affect pregnancy. For instance, the effects of the hormonal changes that occur during pregnancy on the oral tissues have been well documented over time. The physiological state of pregnancy has been associated with gingival changes which are comparable to changes in vaginal and other mucosal tissues

during gestation [1]. The microvasculature of the gingiva changes during pregnancy due to increasing levels of progesterone [2]. Additionally, the dental hard tissues such as enamel are susceptible to increased gastric acid exposure due to morning sickness and increased vomiting especially in the first trimester among pregnant women [1].

Gingivitis is common in the general adult population and the prevalence of periodontitis is reported to be 10 - 15% [3]. The prevalence of oral disease in pregnancy is about 44% [1,4]. There is no prevalence data on periodontal disease in the general popu-

lation in Trinidad and Tobago but it has been reported to be over 67% in a diabetic population in that country [5].

There is an association between gum disease (gingivitis and periodontitis) and adverse pregnancy outcomes such as low birth weight and premature births [6,7]. However, many pregnant women are unaware of this [8,9] and do not often seek dental treatment during pregnancy [10]. It has therefore been recognized that maintaining oral health during pregnancy is an important public health issue worldwide and as such it is now recommended that all women should receive a comprehensive oral health evaluation and risk assessment during pregnancy [11,12]. Pregnancy has been described as a powerful “teachable moment” for the promotion of health as expectant mothers are especially keen on their baby being born healthy. Dentists can therefore seize the opportunity to fulfill their roles as educators and health promoters during this physiological state [13].

The oral health status, practices, knowledge and periodontal status of pregnant women has not to the best of our knowledge been studied before in Trinidad and Tobago and this study aims to provide epidemiological data on this subject with an aim to guiding oral health promotion programmes, as none exists for expectant mothers. This will assist in the delivery of preventive care to expectant mothers and potentially improve pregnancy outcomes in Trinidad and Tobago and the wider Caribbean region. The aim of this study is to report the oral health status, practices, knowledge and periodontal status of pregnant women in a maternity hospital in Trinidad.

## Materials and Methods

A convenience sample of pregnant women who attended the antenatal clinic in Mount Hope maternity clinic during the period of data collection (January to December 2018) was undertaken. The Mount Hope Maternity hospital is accessible to the public without charge like other public-health care facilities in the country. All women who were pregnant and sought health care at that maternity hospital were invited to participate in a descriptive oral health survey involving a self-administered questionnaire and a simple oral health examination at the University of the West Indies (UWI), School of Dentistry clinic, Mt. Hope. Exclusion criteria were males and women who were not pregnant at the time of examination.

Demographic data such as age group, self-reported ethnicity, highest qualification achieved and employment status, medical and dental history, frequency, reason for dental attendance were

determined from a self-administered questionnaire. The patients’ perceived oral health status, knowledge and practices were also determined in the self-administered questionnaire, which was a previously administered questionnaire [8] modified for our population. The questionnaire was pre-tested to ensure clarity and understanding. Feedback was obtained and the questionnaire modified as needed.

Oral examinations were performed by two examiners who had previously been trained in the use of the assessment criteria which was agreed upon by the two participating dentists and were calibrated. Examinations were conducted in an examination room at the Mount Hope Maternity Hospital. Plaque score and BPE scores were recorded with the patients sitting on a chair with their heads tilted backwards and with the aid of the overhead light as well as an additional examination light. A dental mirror and a BPE probe were used to record the presence of plaques as well to identify presence of bleeding and to determine pocket depths. As the examinations were not conducted in a dental setting, teeth were not dried with an air water syringe prior to examination. Examination involved extra-oral assessment, the patients’ visible plaque score using the plaque index of Silness and Løe and the Basic Periodontal Examination (BPE), to determine the periodontal health status.

Guidelines of the Silness and Løe plaque index were followed using the criteria of using 4 surfaces of the 6 selected teeth. There was no substitution for any missing tooth, wisdom teeth were excluded. All surfaces were selected, the scores from the four areas of the tooth were added and divided by four in order to obtain the plaque index [14] for the tooth; the following scores were used: 0 No plaque; 1 A film of plaque adhering to the free gingival margin and adjacent area of the tooth, which cannot be seen with the naked eye, only by using disclosing solution or by using probe; 2 Moderate accumulation of deposits within the gingival pocket, on the gingival margin and/or adjacent tooth surface, which can be seen with the naked eye; 3 Abundance of soft matter within the gingival pocket and/or on the tooth and gingival margin. The Basic Periodontal Examination (BPE), also known as Periodontal Screening and Recording (PSR) Index, is a screening tool for periodontal treatment needs, which identifies the presence or absence of disease [15]. BPE criteria and coding were based on that described by Corbet 2012. Firstly, the mouth was divided into six sextants, only sextants with two or more teeth present were used, all third molars and root remnants were excluded and the highest score was recorded for that sextant. The BPE score was determined us-

ing a World Health Organisation/Community Periodontal Index of Treatment Needs probe periodontal probe [16]. The probe was used to detect bleeding and loss of attachment around the teeth, as well as bone loss between the roots of the teeth (furcation involvement). The presence of recession was recorded and this was measured from cemento- enamel junction to the free gingival margin. All patients who had any conditions which required urgent care were identified, the patients were informed and offered treatment at the UWI dental school emergency clinic and polyclinic.

At the end of the period of data collection, the sample size was 161 participants. Some pregnant mothers did not wish to participate in the study and 10 women were no longer pregnant at the time of presentation for oral examination and therefore their questionnaires were excluded from the final data analysis. A power calculation was not undertaken however the sample size was considered amenable to statistical analyses. No biases regarding the selection of subjects were anticipated and the sample was representative of the population.

Data were analyzed using SPSS version 24.0 in which descriptive analysis, including cross tabulations, were performed. Inference on the cross tabulations was performed, using chi-square tests to test for general associations. The level of significance used was 0.05. Ethical approval was obtained by the University of the West Indies Research Ethics Committee (CEC 242/07/17) and written, informed consent was obtained from each patient prior to the oral health survey. All the materials and methods that are used to complete the study should be mentioned.

**Results**

The socio- demographic and obstetric profiles of the mothers are presented in table 1. Over three-quarters (79.5%) of pregnant women in this study were between the ages 26 to 45. Over a third (34.8%) were of Afro- Caribbean descent, 27.3% were Indo-Caribbean and 36.0% were mixed. More than half (57.1%) had attended high school, 23.6% had attended University and over half (58.1%) of the participants were employed. The majority (82.6%) stated that it was not their first pregnancy and 50.9% were in their 2nd trimester of pregnancy.

The perceived oral health status of the mothers is presented in table 2. Over two-thirds of the respondents in this study (69.1%) rated their oral health as fair or average. The majority (85.1%) reported having at least one or more problems with their oral health with approximately two thirds (65.2%) reported having cavities and almost half (47.2%) said that they were experiencing sensitivity. Over two-thirds (67.5%) of the respondents indicated that their oral health problems sometimes affected their ability to eat as well as their overall general health.

Characteristics	Frequency (%)
<b>Age</b>	
15 - 25	32 (19.9)
26 - 35	98 (60.9)
36 - 45	30 (18.6)
46 and over	1 (0.6)
<b>Ethnicity</b>	
Afro-Caribbean	56 (34.8)
Indo-Caribbean	44 (27.3)
Chinese	1 (0.6)
Mixed	58 (36)
Caucasian	1 (0.6)
Other	1 (0.6)
<b>Highest qualification achieved</b>	
Primary School	16 (9.9)
High school Education	92 (57.1)
University	38 (23.6)
Vocational training	15 (9.3)
<b>Current employment status</b>	
Unemployed	67 (41.9)
Employed part-time	16 (10)
Employed-full time	76 (47.5)
<b>Period of gestation</b>	
1 <sup>st</sup>	25 (15.7)
2 <sup>nd</sup>	81 (50.9)
3 <sup>rd</sup>	53 (33.3)
<b>Is this your first pregnancy?</b>	
Yes	28 (17.4)
No	133 (82.6)

**Table 1:** Socio-demographic information and obstetric characteristics of participants (n = 161).

Variables	Frequency (%)
<b>Oral health status</b>	
Excellent	7 (4.4)
Good	25 (15.7)
Average	67 (42.1)
Fair	43 (27.0)
Poor	17 (10.7)
<b>Self-reported oral health problems</b>	
None	24 (14.9)
One problem	44 (27.3)
Two or more problems	93 (57.8)
<b>Type of oral health problems</b>	
Bleeding gums	60 (37.3)
Toothache	55 (34.2)
Loose teeth	16 (9.9)
Cavities	105 (65.2)
Sensitivity	76 (47.2)
Teeth don't look right	41 (25.5)
<b>Dental problems affected what to eat and overall health in general</b>	
Often	19 (11.9)
Sometimes	108 (67.5)
Never	33 (20.6)
<b>Importance of oral health when compared to overall health</b>	
Not important	0 (0)
Neutral	2 (1.2)
Important	48 (29.8)
Extremely Important	111 (68.9)

**Table 2:** Perceived oral health status of pregnant women (n = 161).

The oral health knowledge of the mothers is presented in table 3. The majority of respondents in this study (98.1%) thought that routine visits to the dentist could help keep teeth and gums healthy. Despite this, (37.3%) thought that dental care should be avoided during pregnancy unless it was an emergency. The majority (80.4%) felt that cavities could not be spread from the mother to the baby's mouth and 73.3% did not believe that a mother's poor oral health could contribute to low birth weight (LBW) babies. Another important finding of this study was that 8.1% of the expectant mothers were smokers.

The oral health practices of the mothers are presented in table 4. The majority of women (87.6%) did not have a dentist, most (91.9%) did not attend the dentist routinely and the most common reason for the last dental visit was pain (35.4%). Almost half (46.0%) of the participants said concerns regarding safety of dental treatment during pregnancy would prevent them from seeking care and more than half (54.7%) said the cost of dental treatment would act as a barrier to dental care.

Over a quarter of pregnant mothers (25.5%) had a BPE of 4 which meant moderate or advanced periodontitis and 34.2% had a BPE code of 3, which meant mild periodontitis. More than one-third of pregnant mothers (37.2%) had gingivitis (BPE codes 1 and 2) and only 3.1% had BPE code 0 meaning healthy periodontium.

There were no associations with ethnicity, education or level of employment and oral health knowledge ( $p > 0.05$ ) and when investigating oral health practices, no associations were observed with ethnicity, level of employment or when last the women visited the dentist versus brushing, flossing and use of mouthwash ( $p > 0.05$ ). However, there were significant associations found between level of education and brushing ( $p < 0.05$ ) (Table 5), between when last the women visited the dentist and their perceived oral health status ( $p < 0.05$ ) and also between age and the use of mouthwash ( $p < 0.05$ ) and smoking ( $p < 0.05$ ) (Table 6). With respect to the periodontal status of the women there was a significant association between BPE and age ( $p < 0.05$ ) (Table 6) and BPE and ethnicity ( $p < 0.05$ ) but no association was observed for education or level of employment with BPE (Table 7).

Item content	True %	False %
Flossing should be done daily to clean in between teeth.	97.5	2.5
Routine dental visits help keep teeth and gums healthy.	98.1	1.9
Pregnant women should avoid dental treatment unless it's an emergency.	37.3	62.7
Dental decay or cavities can spread from the mother to the baby's mouth.	19.6	80.4
A mother's poor oral hygiene may contribute to low birth weight.	26.7	73.3
The first tooth usually appears at around 6 months of age.	78.3	21.7
Sleeping with a bottle containing formula could cause holes on a baby's teeth.	67.7	32.3
Cavities on baby teeth are OK because they will fall out anyway.	11.2	88.8

**Table 3:** Oral health knowledge: percentage of participant responses by individual survey items.

Variables	Frequency (%)
<b>Do you have a dentist currently?</b>	
Yes	20 (12.4)
No	141 (87.6)
<b>Do you attend the dentist for routine care?</b>	
Yes	13 (8.1)
No	148 (91.9)
<b>Do you attend the dentist only when you have a problem?</b>	
Yes	119 (74.8)
No	39 (24.5)
<b>When was the last time you saw a dentist?</b>	
< 6 months	10 (6.2)
6 to <1 2 months	18 (11.2)
1yr to < 2 years	33 (20.5)
2yrs to < 5 years	42 (26.1)
> 5 years	33 (20.5)
Never visited	25 (15.5)
<b>What was the reason for your last dental visit?</b>	
Pain	57 (35.4)
Filling	42 (26.1)
Cleaning	31 (19.3)
Checkup	17 (10.6)
Other	22 (13.7)
<b>What would prevent you from seeking dental treatment, if any?</b>	
Safety concerns regarding treatment during pregnancy	74 (46)
Dental costs	88 (54.7)
Time constraint	31 (19.3)
Oral health not seen as a priority	9 (5.6)
Advised by antenatal care providers not to seek treatment	15 (9.3)
<b>How often do you brush your teeth?</b>	
A few times a week	2 (1.2)
Once a day	34 (21.1)
Twice a day	104 (64.6)
More than twice a day	21 (13)
<b>What oral hygiene products do you use regularly? (Please tick appropriate answer or answers)</b>	
Fluoride toothpaste	147 (91.9)
Mouthwash	77 (48.1)
Dental floss	47 (29.4)
Sugar free gum	5 (3.1)

**Table 4:** Oral health practices (n = 161).

Education						
How often teeth were brushed	Weekly %	Once daily %	Twice daily %	More than twice daily %	Chi-Squared ( $\chi^2$ )	p-value
Primary school	1	2	12	1		
High school	0	19	62	11		
Vocational training	1	0	11	3		
University	0	13	19	6	18.458 <sup>a</sup>	0.03
Use of mouthwash	No %	Yes %				
Primary school	10	6				
High school	46	45				
Vocational training	9	6				
University	18	20			1.493 <sup>a</sup>	0.684
Use of Floss	No %	Yes %				
Primary school	14	2				
High school	68	23				
Vocational training	10	5				
University	21	17			7.369 <sup>a</sup>	0.061

**Table 5:** Dental hygiene practices of women versus education achieved.

Values are statistically significant (p < 0.05).

15 - 25	Age				Chi-Squared ( $\chi^2$ )	p-value
	26 - 35	36 - 45	46 and over			
1	3	1			0	
6	5	0			0	
8	36	5			0	
12	33	10			0	
5	21	14			1	
32	98	30			1	22.777 <sup>a</sup> 0.030
Mouthwash	Yes	9	55	13	0	
	No	23	42	17	1	
Total		32	97	30	1	9.189 <sup>a</sup> 0.027
Smoking	Yes	3	6	3	1	
	No	28	90	27	0	
Total		31	97	30	1	11.862 <sup>a</sup> 0.008

**Table 6:** Age versus BPE, use of mouthwash and smoking.

Values are statistically significant (p < 0.05).

Afro-Caribbean		Ethnicity					Chi-Squared (χ <sup>2</sup> )	p-value
		Indo-Caribbean	Chinese	Mixed	Caucasian	Other		
BPE	0	1	3	0	1	0	0	
	1	5	0	1	4	0	1	
	2	15	13	0	20	1	0	
	3	21	16	0	18	0	0	
	4	14	12	0	15	0	0	
Total		56	44	1	58	1	1	36.593 <sup>a</sup> 0.013
Primary school		Level of qualification					Chi-Squared (χ <sup>2</sup> )	p-value
		High school	Vocational training	University	Total			
BPE	0	0	2	2	1	5		
	1	0	5	5	1	11		
	2	3	33	11	2	49		
	3	6	29	14	6	55		
	4	7	23	6	5	41		
Total		16	92	38	15	161		12.938 <sup>a</sup> 0.374
Un-employed		Level of employment					Chi-Squared (χ <sup>2</sup> )	p-value
		Part-time employed	Full-time employed	Self-employed	Total			
BPE	0	3	1	1	0	5		
	1	7	1	3	0	11		
	2	24	1	23	1	49		
	3	19	7	29	0	55		
	4	14	6	20	0	40		
Total		67	16	76	1	160		12.787 <sup>a</sup> 0.385

**Table 7:** BPE versus ethnicity, level of qualification and level of employment.

### Discussion

This study sought to describe knowledge of the periodontal status of pregnant women in Trinidad along with their perceived oral health status, practices and knowledge. No previous data exists for this population.

Less than one quarter ( 20.1%) of participants rated their oral health as above average in this study (37.7%) as fair or average. This finding may suggest there exist a level of unmet dental and oral health need among pregnant mothers in Trinidad. Further evidence of unmet need among this group was exhibited by the finding of higher levels of toothache (34.3%) and cavities (65.2%). These findings were higher than those found in similar study [8] with 16.9% (toothache) and 41.5% (cavities). In contrast to the partici-

pants perceptions of their own oral health, the majority, (68.9%) felt that oral health is extremely important when compared to general health. This finding is higher than that of another study that reported only 46.5% [8]. Despite this, our study showed that over 90% of participants did not attend the dentist for routine care and nearly 75% attended only when they had a problem. This is consistent with other documented evidence where it was found that pregnant women are hesitant to take up dental treatment [17-19]. These findings could be due to misinformation about the relationship between pregnancy and dental procedures or could suggest the existence of other potential barriers to care among this cohort such as cost, which nearly 55% said in this study was a barrier. This is agreement with other studies documenting cost as a significant barrier for accessing care [12,20,21].

In the UK under the National Health Service, dental treatment is free for pregnant women and up to one year post-partum. Yet a study on immigrant mothers in North London found attendance rates of 32% [22]. Other studies done in rural communities in India [23] and Nigeria [24] also found very low attendance for dental treatment during pregnancy. Currently dental services in Trinidad can be accessed privately (fee per item service) or free of cost through government funded public health facilities. However, no documentary evidence is currently available to identify the barriers to accessing care at these facilities.

Also, almost half of the participants were concerned about safety during dental treatment and that could potentially affect health seeking behaviors among this group. This concern found in the Trinidad cohort is similar to the USA [12] and Australia [8,10]. Additionally, of concern was the finding that 37.3% of pregnant women felt dental care should be avoided during pregnancy. This misconception has been reported in other studies around the world [18,25-27]. The majority also had the false impression that cavities could not be spread from the mother to the baby's mouth and nearly three-quarters did not believe that a mother's poor oral health could contribute to low birth weight (LBW) babies. Additionally, almost one third (32.3%) did not believe that sleeping with a bottle containing formula could cause holes on a baby's teeth. Safety concerns, avoidance of care and the reported misconceptions can be addressed by improving awareness of oral health during pregnancy in Trinidad through education and health promotion.

In this study most participants did have good oral health practices with over three-quarters reporting that they brushed their teeth twice daily and the majority reporting the use of fluoridated toothpaste. This is similar to other studies [8,20,21]. However, despite the positive reported oral health behaviors, nearly 60% of pregnant mothers had some form of periodontitis. Similar studies have found high prevalence of periodontal disease in pregnant women such as Gupta and Acharya, [23] (95%), Miyazaki, *et al.* [28] (95%) and Jago, *et al.* [29] (84%) and more recently Gonzalez-Jaranay, *et al.* [30]. Such findings may indicate that dental health education inclusive of proper oral hygiene techniques as well as routine dental hygiene procedures are required for this group.

Another important finding of this study was that 8.1% of the expectant mothers were smokers. This finding is of concern as smoking in pregnancy is associated with poor pregnancy outcomes [31,32]. The literature shows that internationally, large numbers

of pregnant women smoke, with rates between 12% and 22% in high-income countries [33]. There is an important need to promote smoking cessation not only in the general population but also in this at risk group as well.

Limitations of this study may include the oral examination protocol used might underestimate the prevalence of oral health problems. The literature has demonstrated that partial examination protocols underestimate the amount and this estimate bias varies according to site, type, number of sites per tooth and number of quadrants recorded [34]. Other limitations of this study include the periodontal health status of this population may not be as evenly distributed in the general population as it was in this convenience sample. Also, there may have been bias in the self-reported oral health assessment and this study did not determine the number, if any, of patients with gestational diabetes, which may contribute to the level of disease reported.

## Conclusion

The findings reported in this study suggest important gaps and misconceptions in oral health knowledge and practices of pregnant women in Trinidad. This may have implications for the general and oral health of their children and indicate the need for oral health promotion among this group. The prevalence of periodontitis was found to be high and related to age and ethnicity. Understanding oral health needs of pregnant women can guide oral health promotion and delivery of preventive care and potentially improve pregnancy outcomes.

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## Conflict of Interest

The authors declare that they have no conflict of interests or financial interests.

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